Polynomials

ax^2+bx+c

$\alpha+\beta=\frac{-b}{a}$, $\alpha\beta=c/a$

$x^2-(\alpha+\beta)x+\alpha.\beta$

ax^3+bx^2+cx+d

$\alpha+\beta+\gamma=\frac{-b}{a}$; $\alpha\beta+\beta\gamma+\gamma\alpha=\frac{c}{a}$; $\alpha.\beta.\gamma=-d/a$

$x^3-(\alpha+\beta+\gamma)x^2+(\alpha\beta+\beta\gamma+\gamma\alpha)x-\alpha\beta\gamma$

Real Numbers

$HCF(a,b)\times LCM(a,b)=a\times b$

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Linear equations in two variables

$a_1x+b_1y+c_1=0$

$a_2x+b_2y+c_2=0$

$\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$ unique solution

$\frac{a_1}{a_2}=\frac{b_1}{b_2}=\frac{c_1}{c_2}$ Infinite solutions

$\frac{a_1}{a_2}=\frac{b_1}{b_2}\neq\frac{c_1}{c_2}$ No solution

Trigonometry

$\sin^2\theta+\cos^2\theta=1$

$1+\tan^2\theta=\sec^2\theta$

$1+\cot^2\theta=\csc^2\theta$

θ	$0°$	$30°$	$45°$	$60°$	$90°$
$\sin\theta$	0	$1/2$	$1/\sqrt{2}$	$\sqrt{3}/2$	1
$\cos\theta$	1	$\sqrt{3}/2$	$1/\sqrt{2}$	$1/2$	0
$\tan\theta$	0	$1/\sqrt{3}$	1	$\sqrt{3}$	N.D
$\csc\theta$	N.D	2	$\sqrt{2}$	$2/\sqrt{3}$	1
$\sec\theta$	1	$2/\sqrt{3}$	$\sqrt{2}$	2	N.D
$\cot\theta$	N.D	$\sqrt{3}$	1	$1/\sqrt{3}$	0

Quadratic Equation

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

If $b^2-4ac>0$, 2 distinct real roots

If $b^2-4ac=0$, 2 equal real roots

If $b^2-4ac<0$, no real roots

If $b^2-4ac\geq0$, two real roots

Statistics

Arithmetic Mean

i) Direct method. $\bar{x}=\frac{\Sigma f_i x_i}{\Sigma f_i}$

ii) Assumed Mean $\bar{x}=a+\frac{\Sigma f_i d_i}{\Sigma f_i}$

Mode $=l+\left(\frac{f_1-f_0}{2f_1-f_0-f_2}\right)h$

Median $=l+\left(\frac{\frac{n}{2}-cf}{f}\right)h$

Empirical formula:

3 Median = Mode + 2 Mean

Surface area and Volume

	LSA	TSA	Volume
cube	$4a^2$	$6a^2$	a^3
cuboid	$2h(l+b)$	$2(lb+bh+hl)$	lbh
Cylinder	$2\pi rh$	$2\pi r(h+r)$	πr^2h
Hollow cylinder	–	$2\pi h(R+r)+2\pi(R^2-r^2)$	$\pi(R^2-r^2)h$
cone	πrl	$\pi r(l+r)$	$\frac{1}{3}\pi r^2h$
sphere	–	$4\pi r^2$	$\frac{4}{3}\pi r^3$
Solid hemisphere	$2\pi r^2$	$3\pi r^2$	$\frac{2}{3}\pi r^3$
Hollow hemisphere	–	$2\pi(R^2+r^2)+\pi(R^2-r^2)$	$\frac{2}{3}\pi(R^3-r^3)$

Areas related to circles

Arc length $\frac{\theta}{360}\times2\pi r$

Area of sector $\frac{\theta}{360}\times\pi r^2$ (or) $\frac{lr}{2}$

Coordinate Geometry

Distance formula $=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

Section formula

$m:n$

(x_1,y_1) (x,y) (x_2,y_2)

$(x,y)=\left(\frac{mx_2+nx_1}{m+n},\frac{my_2+ny_1}{m+n}\right)$

Mid point formula $\left(\frac{x_1+x_2}{2},\frac{y_1+y_2}{2}\right)$

Centroid formula $\left(\frac{x_1+x_2+x_3}{3},\frac{y_1+y_2+y_3}{3}\right)$

AP

$a_n=a+(n-1)d$

$S_n=\frac{n}{2}[2a+(n-1)d]$

$S_n=\frac{n}{2}(a+l)$